Abstract: Despite the potential of wiki-based writing for learning, students struggle with collaborative writing especially when it is necessary to revise text-sections that are written by others. The study investigated whether collaboration scripts help improving students’ revision activities and the quality of wiki-texts. We compared scripted (script-) with unscripted (script-) collaboration in a wiki-based writing setting that was adapted for educational purposes. Students from two university courses participated in a one week collaborative writing activity. Results showed that students in the scripted condition outperformed students in the unscripted condition with respect to revision behavior and text-quality. Results from analyzing students’ discussions during the writing activity revealed increased coordination concerning task division and increased communication frequency for students in the scripted condition. Results indicate that collaboration scripts may trigger coordination. Our findings suggest that wikis are suitable to foster writing skills in university settings if wikis are tailored to educational contexts.

Introduction
The following study explores ways to improve wiki-based writing by scripting students during main writing activities supporting coordination. Collaborative writing in online learning platforms has become a common activity in higher education and it is now a major ingredient of many Master program requirements (e.g. Utrecht University, Uulu University, University of Helsinki). Based on the process model of writing developed by Flower and Hayes (1981), individual as well as collaborative activities take place during the main writing phases of planning, drafting and reviewing. Various technologies (Google Docs, MediaWiki, MoodleWiki) emerged that enable collaborative writing and support students in co-editing shared documents in collaboration with peers. Wiki-based writing settings provide excellent possibilities for learning, because students can asynchronously edit a wiki-text, monitor changes on the wiki-text and communicate with peers using discussion facilities. Often however, students are hesitant when it comes to revision activities. Especially revising text sections of others is a challenge for inexperienced writers. As a result, the quality of the joint text decreases and students miss potential learning opportunities. Students’ revision problems might have to do with increased coordination demands in collaborative writing. How can these higher coordination demands be met? Discussion facilities in wikis can facilitate the coordination of writing activities but often, the mere availability of discussion facilities is not sufficient. Instructional support is necessary for students to benefit from those facilities (Blakselee, 1992). For instance, collaboration scripts provide support by structuring students’ interaction (Kollar, Fischer Hesse, 2006; King, 2007). Collaboration scripts prescribe an optimal sequence of activities that specifies how and when a group of learners should work together. (O’Donnell Dansereau, 1992). For wiki-based writing settings, collaboration scripts seem particularly suitable, because they can help students structure their writing process by suggesting a task division resulting in an optimal sequence of individual and collaborative working phases (Hermann, Rummel, Spada, 2001). Individual working phases are a central aspect during the main writing activities (planning, drafting and reviewing). A central goal of collaborative working phases is to communicate with peers, which is necessary for coordinating the main writing activities. We assume that following a collaboration script, affects not only the way students coordinate writing activities but also yields positive effects with regard to the quality of the wiki-text.

Collaborative Writing
With the introduction of new collaborative writing technology into educational settings, collaborative writing has shifted towards a process with the focus on creating a joint product. In collaborative writing settings that are wiki-based, learners can access a shared document, which changes the way collaborative writing takes place. Earlier, the task of collaboratively producing a document included heavy exchange of email and a sequence of writing and reviewing until the document was finalized. Today, email exchange can be avoided using asynchronous collaborative writing technology such as wikis. In wiki-based writing, several users can collaborate as authors by remotely accessing and editing wiki-text. The wiki-text becomes a product with joint ownership, because authors do not only draft and edit sections created by them but also revise sections created by peers. Additionally, users have the possibility to discuss aspects related to the wiki-text, by adding comments in a simple discussion page. The original purpose of wikis was to offer software developers a tool that allows for communicating ideas concerning software design (Leuf Cunningham, 2001). Recently, wikis have been investigated for educational purposes in the area of computer-supported collaborative learning research (Trentin,
For collaborative activities to be successful, coordination is required of both, content (what are we agreeing to) smaller than in Wikipedia communities. Therefore, we assume that in higher education, coordination becomes thus resolving cognitive conflicts. superfluous revision and to re-organize and rewrite paragraphs of peers for the purpose of integrating ideas and cognitive point of view, conflicting views are only beneficial for learning if conflicts can be resolved (Renkl board is crucial, because it helps to resolve cognitive conflicts. This is important, because from a socio-assign tasks and attune own activities to the activities of others. In addition, taking advantage of a discussion discuss and agree on a writing process before starting the writing activities. A discussion board is helpful to re- available communication channels such as discussion boards. In wiki-based writing settings, learners should during all activities of the writing process. One way how coordination occurs is through communication using coordination in collaborative writing settings is required collaborated working phases (Herrmann et al., 2001). Coordination in collaborative writing settings is required during individual or collaborative phases. Planning activities include reading relevant literature, generating ideas, outlining criteria for the text and planning the writing process. Drafting activities involve making notes, writing down ideas but they also include the production of first individual chunks of text. Reviewing activities consist of evaluating text and subsequently revising the text (for an extensive overview of the activities in collaborative writing see euwirth et al., 2000). The task of revising text needs to receive special attention, because students generally seem to have problems with revision activities (roiske, arciss Mcamara, 2010). In collaborative writing, this problem is increased, because students are challenged to revise text parts that were not written by themselves but by co-authors. Existing research on wiki-based writing has shown that students tend to avoid editing or revising text of others (udd, Kennedy, Cropper, 2010). After contributing to the wiki-text individually, students are supposed to edit the text parts including revising text produced by peers. But students hesitate to restructure the shared text or to adapt existing paragraphs written by others. Often, contributions result in individually adding paragraphs into the existing wiki-text without revising the text written by peers. As a result, the overall text quality is suffering. According to writing expertise research, little text revision affects the text quality negatively. Lacking revision leads to less coherent text and more errors with respect to grammar and orthographical errors (roiske et al., 2010). Revising paragraphs of others in order to construct a coherent text is not only important with respect to text quality. Also from a learning perspective, text revision is of great importance, even though challenging. Students need to integrate multiple views to achieve a coherent text structure. This integration process often leads to cognitive conflicts. According to Kimmerle and colleagues (Kimmerle, Moskalik, Cress, 2009), those cognitive conflicts resulting from the incongruity between the individual knowledge and the information in the shared document can lead to learning gains. However, they only can lead to learning gains if those conflicts can be reconciled (Chi, Siler, doug, camauuchi, Hausmann, 2001). In wiki-based writing, reconciliation takes place through revision activities. Therefore, revision activities are very important for learning. One central question that guided the design of our study was: How can we adapt wiki-based writing settings to engage students in revision activities and to increase text quality?

Conclusion
For collaborative activities to be successful, coordination is required of both, content (what are we agreeing to do) and process (how are we doing it) (Clark, 1996). Coordination strategies need to be applied to ensure a joint focus among co-authors, resulting in meaningful task division (who does what) during individual and collaborative working phases (Herrmann et al., 2001). Coordination in collaborative writing settings is required during all activities of the writing process. One way how coordination occurs is through communication using available communication channels such as discussion boards. In wiki-based writing settings, learners should discuss and agree on a writing process before starting the writing activities. A discussion board is helpful to re-assign tasks and attune own activities to the activities of others. In addition, taking advantage of a discussion board is crucial, because it helps to resolve cognitive conflicts. This is important, because from a socio-cognitive point of view, conflicting views are only beneficial for learning if conflicts can be resolved (Renkl Mandl, 1995). Communicating while collaboratively writing a text might enable learners to overcome making superficial revision and to re-organize and rewrite paragraphs of peers for the purpose of integrating ideas and thus resolving cognitive conflicts.

The extent of coordination that needs to take place is dependent on several aspects. One aspect is the group size: In large groups including large numbers of authors, spending time with coordination is not helpful because negotiations become ineffective and authors start relying on decisions that were made in the first place not willing to change those decisions. Findings from Wikipedia research indicate that collaboration in large Wikipedia communities were less successful when heavy coordination was involved (Kittur Kraut, 2008). However, coordination was more effective in small Wikipedia communities. Another aspect that affects the need for coordination is the duration of the activity. Findings from Wikipedia research indicated that authors tended to rely on coordination more heavily in the beginning of a writing process. As Wikipedia-authors developed a shared model over time, coordination was not necessary anymore (Kittur Kraut, 2008). In the area of higher education, collaborative writing usually takes place in smaller groups and the time frame is smaller than in Wikipedia communities. Therefore, we assume that in higher education, coordination becomes
crucial for the process of writing and its outcome, the shared text. Another aspect affecting the amount of coordination is related to the way knowledge is distributed among co-writers. In a co-authorship where students share a joint/overlapping knowledge base that is relevant to the writing task at hand, little coordination might suffice. However, if students’ prior knowledge is disjointed but complementary with respect to the task, a higher amount of coordination is necessary. Task characteristics are yet another aspect influencing the amount of coordination needed. Depending on the theme and structure of a collaborative writing task, the writing requires different levels of prior knowledge integration. If a writing task demands the integration of multiple views, the collaborative writing process requires not only task division but also communication about how the perspectives can be described so that a coherent picture is presented. As a result the amount of coordination is increased. In sum, besides group-size and task duration, knowledge distribution and task characteristics determine how much it is necessary to coordinate the writing process.

Collaboration scripts could be a promising way to support writing in wiki-based settings, because they help structuring a learning process by dividing tasks resulting in an optimal sequence of individual and collaborative working phases (Hermann et al., 2001). Typically, collaboration scripts aim at supporting coordination among group members, by prompting particular types of cognitive, metacognitive and social activities (King, 2007). Research studies in the area of computer supported collaborative learning indicate that collaboration scripts can promote learners’ problem solving activities and knowledge acquisition (Kollar et al., 2006; O’Donnell, 1999). For instance, Weinberger and colleagues (Weinberger, Stegmann, Fischer, 2010) successfully scripted students to engage in a discussion. The collaboration script divided the task of argumentation into subtasks of first formulating an argument, then constructing a counterargument and so on. This structure was used cyclically to engage in a successful discussion. Rummel and Spada (2005) applied a collaboration script in a video-conference setting to support students of Medicine and Psychology collaborating on complicated patient cases. Scripted collaboration resulted in an improved diagnosis and treatment suggestion when compared to an unsupported collaboration control group. The collaboration script prescribed the separation of individual and collaborative work phases encouraging students to exchange information effectively. Yet, results on scripting effectiveness are not homogeneous. Some findings in the area of problem solving suggest that collaboration scripts are not always effective (Haake & Fister, 2010; Kollar, Fischer, Slotta, 2007; Stegmann, Weinberger, Fischer, 2007). Under what conditions are scripts ineffective? Deiglmayr and Spada (2010b) found that in a collaborative problem solving activity that required collaborative drawing of inferences, a collaboration script did lead to improved performance. The authors concluded that for the purpose of collaborative inference drawing, a separation of activities was inappropriate. Concluding from the studies described above, it seems as though collaboration scripts are only effective under certain task conditions. First, collaboration scripts should be employed for tasks that can be divided into sub-activities. Second, collaboration scripts might be beneficial for tasks being carried out in a simple repeatable sequence (Deiglmayr & Spada, 2010a). Therefore, it is our assumption that collaboration scripts can support learners in wiki-based writing settings effectively, because in wiki-based writing, the task can be divided in activities of planning, drafting and reviewing (which includes revising) and these activities can be cyclic depending on the duration and complexity of the writing task. Because wiki-writing activities are divisible and can be carried out cyclically, we think that collaboration scripts are suitable to support students’ revision activities and to improve overall quality of produced wiki-texts.

Participants were freshmen university students enrolled in BA education courses. All students were recruited from two introductory academic writing courses (class sizes: 35 and 38 students, respectively) at the institute of educational research. The courses were taught by different instructors.

Students were randomly assigned across courses to one of two conditions, script (n=36) and script- (n=37) condition. Students participated in a wiki-based writing task, which included the activities planning, drafting
and reviewing. Altogether, 23 groups worked in triads and 1 group (script-) consisted of four students. 12 groups worked with a collaboration script (script) and 12 groups worked without a collaboration script (script-).

Distributed prior knowledge was invoked by instruction (Figure 1). Every student in a triad read a different article (except the group with four students in which 2 students received the same article for reading). The topic of the writing assignment was chosen so that the knowledge of all three students was relevant, hence knowledge was complementary. The task was to write a summary on the topic of “school’s contribution to student development”. Each wiki-text included a pre-structure that required students to not only list but integrate their prior knowledge. The students were asked to write not more than 1000 words for the whole assignment.

Figure 1. Article assignment in every group

prior to the planning activity, the pre-questionnaire was administered. With start of the planning activity, every student was assigned to one article via email including the topic of the writing assignment. Students had one week to read the article they were assigned to. After the planning activity, the wiki access code for each student was sent personally via email. Access codes were anonymised by providing login names consisting of random letters and numbers (e.g. AB3). Anonymisation was done to ensure that students could not communicate with each-other outside the wiki setting. Every student only had access to one wiki-text that they shared with their peers. Students worked for one week on the wiki-text in their groups. Halfway through the week, an email was sent to everyone, to encourage the writing and reminding that the deadline was two days later without extension. After the deadline, the wikis were not accessible anymore for the students. During the following week, the post-questionnaire was administered and afterwards the writing experience using the wiki was discussed in each course separately.

We used MediaWiki (Barrett, 2009) for the wiki-based writing setting. MediaWiki software, best known from Wikipedia, includes three functionalities that are crucial for collaborative writing: article, versioning and talk pages. A MediaWiki may include several articles. An article can be modified using formatting attributes such as titles or hyperlinks. Multiple authors can login to the wiki-system and view as well as edit an article. Furthermore, authors can use the versioning functionality of MediaWiki to observe and compare revisions of the article. The versioning functionality tracks every revision made. Considering that author I edited an article and saved it, author II can view the changes by comparing the previous version of the article with the current one. The third functionality, the talk pages, is designed to support rudimentary communication. MediaWiki is not designed for educational purposes especially the talk pages have their limitations when using it in an educational setting. Talk pages allow the user communicate with other users by adding comments (Cunningham, 2006). For educational purposes, talk pages are insufficient, because they provide little means to structure a discussion, to reply to others and to lead topic-related discussions. Hence, we drastically re-designed the standard MediaWiki for short-term writing tasks in university settings. Each wiki that was accessed by a group, included 6 tabs: 1. Text display, 2. Editing 3. Discussion board, 4. Worked example, 5. Versioning, 6. Wiki-help.

1. Text display: The text display showed the wiki-text document. This included a pre-structure consisting of 6 Titles and references were listed at the end of the page. We included a pre-structure because the pre-structure required the learners to integrate their prior knowledge (instead of just listing different views).
2. Editing: The editing of the wiki-text document was restricted to linear text only. Hyperlinks were excluded.
3. Discussion board: Instead of the talk pages being used in Wikipedia, a threaded discussion board was included. The threaded discussion board is an extension of MediaWiki called LiquidThreads (Garrett, 2009). Users can create threads, which can be nested and sorted by date. Below every entry, the user can press a reply button, which conveniently creates a new entry that is associated with the thread replied to. Every entry in a threaded discussion is automatically signed and dated. New threads can be started depending on the topic or subject of discussion.
4. Worked example: This tab was dedicated to display four rules and examples for writing. For every rule, one positive and one negative example were included. The rules referred to writing problems that reduce text quality, specifically lack of logic (rule A), nested sentences (rule B), erroneous expressions (rule C) and grammar errors (rule D).
5. Versioning: The versioning functionality was the same as in Wikipedia.
6. Wiki-help: A help page was added to facilitate the technical handling of the wiki.

The Collaboration Script
In the script+ condition, the collaboration script was displayed in the wiki adjacent to the discussion board. The collaboration script included instructions for interaction, specifically a description of an optimal sequence with respect to task division resulting in individual and joint working phases. The main sequence consisted of the following activities: text production, text review and text revision. The collaboration script suggested a sequence in which these activities would be carried out best by each group within the time frame. For every day of the week, one activity was suggested: For day one, the students were instructed to agree with their co-authors on a schedule for the week. It was suggested to spend the first day producing their individual text parts. For day two, the students were asked to finalize their individual text part in the wiki and to start reading the sections of their co-authors. Day three and four focused on revising the overall text. The following sequence was suggested for the revisions: One person selects a sentence that needs to be revised and pastes that sentence into the discussion board. The next person edits the sentence. The next person takes the sentence and integrates it into the wiki-text. For day four, the script suggested to focus on writing rules of the worked example A and B. For day five, rules C and D. Day five instructed the students to reread the wiki-text and to discuss and resolve open issues and to revise the wiki-text again. Students had to distribute the activities by themselves. The reviewing activities (review & revision) were suggested to take place in two cycles during the available time. In addition, the students were encouraged to discuss problems and read the worked example that was included in both conditions, script+ and script-.

Questionnaires
The pre-questionnaire included two sections. Section A included items regarding computer attitudes (Likert scale in which 1= Don’t agree at all and 5= I absolutely agree) and section B assessed experiences with the computer (Likert scale in which 1= never and 5= very frequently). Reliability was .851 and .685, respectively.

The post-questionnaire included several sections including one open-response item and several Likert-type items (Likert scale in which 1= Don’t agree at all and 5= I absolutely agree). The first section asked students to let us know whether they communicated with their co-authors outside the wiki. Perceived use was assessed for the main functionalities of the wiki respectively, those are: text editing, discussion board, worked example and versioning. Cronbach’s Alpha of the perceived use scale was .875.

Content Analysis
A content analysis was performed on both, the wiki-texts and discussion contributions. All content analyses were based on frequencies. The wiki-text was analyzed by looking at contributions per student and by looking at the wiki-text of each triad. Per student analysis included frequency measure with respect to number of characters written and number of peer edits per student for all 73 students. Number of characters was measured using a customized MediaWiki user contribution page, which includes revision history and difference between revisions. This page offers menus to select and filter contributions and edits by every student separately. We investigated students’ revision behavior by counting the number of times a student editing text-sections. Edits included the operations “move”, “delete” and “add”. Every operation was counted equally as an edit. Peer edits per student included only edits done on sections that were written by peers, to tease apart the difference between edits on own sections and peer-edits. Two raters used MediaWiki user contribution page to analyze the wiki-texts (Krippendorf’s α = .98).

Content analysis was also done for all 24 wiki-texts. The unit of analysis for the wiki-text was the document itself as only frequencies were calculated. Text quantity was calculated based on the number of characters included in a wiki document. Text quality was evaluated on the dimensions grammar and orthographical errors as well as coherence. We used MS WORD spell checker functionality as a technique for checking grammar and orthographical errors. As an indicator for coherence, we looked for evidence to integrate perspectives induced by the articles that the students read. Indicators were for instance “In contrast to author II...”, “Similar to...”, “Different than author I, author II views...”. These indicator words establish coherence by comparing and contrasting perspectives (Proske et al., 2010). Calculating intrarater reliability between two raters resulted in an Alpha of .96 (Krippendorf).

For manipulation check purposes, we looked at whether students took into account the collaboration script during discussions, particularly discussions about task division. We counted indicators for task division agreements with respect to time and task (Krippendorf’s α = .92). In addition, discussion contributions were analyzed in terms of number of contributions by counting the discussion contributions in all 24 wikis.

Results
From 73 course participants 8 students logged in to the wiki system, but did not participate at all in the wiki-based writing activity. Hence, they were excluded from further analysis resulting in $n = 65$. Not all participants
took the pre- and post-questionnaire and some filled in the questionnaire only half-way. Therefore, the number of participants varies for every analysis.

Results from the pre-questionnaire indicate that there are no significant differences between students in script+ and students in script- condition with respect to computer attitudes ($\chi^2(1, 54) = .219$, $p = .64$, partial $\eta^2 = .004$) and computer experiences ($\chi^2(1, 54) = .002$, $p = .97$, partial $\eta^2 = .000$). Wiki-texts in the script+ condition were on average a bit longer than wiki-texts in the script- condition but this difference did not reach statistical significance (Table 1). All students reported that they solely relied on the wiki for communication purposes. Hence, no other communication channels (e.g. chat, phone) were used.

Wiki-texts in the script+ condition were on average a bit longer than wiki-texts in the script- condition but this difference did not reach statistical significance (Table 1). All students reported that they solely relied on the wiki for communication purposes. Hence, no other communication channels (e.g. chat, phone) were used.

Results from the post-questionnaire: We were interested in students’ perceptions concerning the wiki-based writing setting. For the purpose of using a wiki for educational purposes, we drastically adapted the MediaWiki functionality towards students needs. The post-questionnaire looked at differences of perceived use with respect to the adapted wiki functionalities (Text editing, discussion board, worked example and versioning). On average, students perceived working with the editing functionality (M=3.45, SD=.79) and working with the discussion board (M=3.28, SD=.91) as useful. For instance, a high percentage of students reported that editing functionality (70.9%) and discussion board (75%) were helpful. The worked example (M=2.84, SD=.70) and versioning (M=2.91, SD=.61) were perceived as less useful. Only 25% agreed that the worked example was helpful and only 27.8% agreed that versioning was helpful.

Table 1. Mean frequencies Script+ vs. Script-

<table>
<thead>
<tr>
<th>Unit</th>
<th>Coding category</th>
<th>Script+</th>
<th>Script-</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td><strong>Individual - level</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wiki-text</td>
<td>Nr of characters</td>
<td>4157.45</td>
<td>1660.78</td>
</tr>
<tr>
<td></td>
<td>Nr of peer edits (revision)</td>
<td>2.58</td>
<td>2.56</td>
</tr>
<tr>
<td><strong>Group- level</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wiki-text</td>
<td>Nr of perspective integration (coherence)</td>
<td>10.50</td>
<td>5.73</td>
</tr>
<tr>
<td></td>
<td>Nr of grammar &amp; orthographical errors</td>
<td>5.58</td>
<td>5.62</td>
</tr>
<tr>
<td></td>
<td>Nr of contributions</td>
<td>45.75</td>
<td>31.02</td>
</tr>
<tr>
<td></td>
<td>Nr of task division mentions</td>
<td>8.58</td>
<td>4.46</td>
</tr>
</tbody>
</table>

Significant difference, $p < .05$

Discussion

Based on our assumption that coordination is a prerequisite for students to revise peer-authored texts effectively, we investigated whether the provision of a collaboration script improves revision behavior of students. Furthermore, we measured whether providing a collaboration script also affects the overall text quality. Our findings indicate that students benefit from the collaboration script: We found that following the script resulted in increased revision behavior. Hence, the collaboration script seems to have counteracted students’ hesitation to rewrite texts of others. Based on literature in academic writing performance (Proske et al., 2010), revision
behavior is an important factor that affects the quality of texts positively. Indeed we were able to show that not only revision behavior, but also the quality of wiki-texts increased for students who had a collaboration script available. Also from a learning perspective, supporting revision behavior is important, because it provides opportunities to resolve cognitive conflicts. Another assumption was that discussion boards alone are not sufficient for wiki-based writing in educational settings. We assumed that the sole availability of a discussion board would not be sufficient to meet students’ coordination demands. An analysis of students’ discourses revealed that the collaboration script in combination with the discussion board resulted in increased coordination activities: Students not only contributed more to the discussion board, they also used the discussion board for coordinating task division, which was the intended purpose of the collaboration script.

Our overall goal was to tailor wiki-based writing settings to educational contexts. Besides the experimental variation, we wanted to know if our adaptations of the MediaWiki were perceived as useful. Findings show that students perceived the main components, the wiki-text and wiki-editing as useful. Based on questionnaire results, the LiquidThread implementation (Barrett, 2009) as an alternative to wiki talk pages was perceived as useful. In contrast, the worked example was perceived as less useful. This result is confirmed by the contents that were focus of discussion in the discussion board. Only in two wikis, the presence of a worked example was mentioned. One reason might have to do with the fact that the worked example was not adjacent to the wiki-text but situated in another tab. Hence, students always had to switch between tabs and did not have the wiki-text and the worked example side by side. Situating the worked example adjacent to the wiki-text might have resulted in a higher usefulness of the worked example. The versioning tab, which was implemented as known in Wikipedia, was also not perceived as useful and not mentioned at all in the discussions. Future efforts should think of better ways to include the versioning.

I tations an Future Questions

We were able to show that our collaboration script is suitable for the wiki-based writing setting described in the paper. Wikis provide the possibility to collaborate asynchronously, that is, only one author at a time can make changes in the wiki-text. Asynchronicity leads to a very procedural writing process in which every author has to wait until a change by a co-author has been made. Therefore, a fixed collaboration script was appropriate for this writing task. For collaborative writing settings that allow synchronous access such as google Docs, the drafting and revision process becomes much more intertwined. A separation of activities is difficult and might be ineffective (Deiglmayr & Spada, 2010b). Hence, in synchronous collaborative writing settings, a fixed collaboration script might not be sufficient. Support that is adaptive to the authors writing activity might be more appropriate.

The study was conducted in a field setting controlling conditions as much as possible. Some conditions of the study design were unrealistic in favor of controlling the setting. For instance, under common university course conditions, students might be in contact with their co-authors from the beginning and therefore start negotiating criteria for the wiki-text already during the planning activities. In our study, participants were not able to communicate with their co-authors until the planning activity was finished. Hence, the planning activity was determined to be individual work.

Finally, the study just took a snapshot of a writing process. It included just two cycles of reviewing. Common writing assignments include longer and more frequent cycles of reviewing and editing. Future research on wiki-based writing should look at changes of coordination during longer periods of time.

Re ferences


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Weinberger, A., Stegmann, K., & Fischer, F. (2010). Learning to argue online: Scripted groups surpass individuals (unscripted groups do not).